

Translocation as a Conservation Tool for Restoring Insular Avifauna

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Report Documentation Page		Form Approved OMB No. 0704-0188
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1. REPORT DATE NOV 2011	2. REPORT TYPE	3. DATES COVERED 00-00-2011 to 00-00-2011
4. TITLE AND SUBTITLE Translocation as a Conservation Tool for Restoring Insular Avifauna		5a. CONTRACT NUMBER
		5b. GRANT NUMBER
		5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER	
	5e. TASK NUMBER	
	5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) University of Missouri, Fisheries and Wildlife, Suite 302, 1105 E. Rollins Street, Columbia, MO, 65211		8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited		
13. SUPPLEMENTARY NOTES Presented at the Partners in Environmental Technology Technical Symposium & Workshop, 29 Nov ? 1 Dec 2011, Washington, DC. Sponsored by SERDP and ESTCP. U.S. Government or Federal Rights License		
14. ABSTRACT Faced with climate change, species invasions and habitat alterations, conservationists are using triage approaches for biodiversity preservation on the islands of Pacific Oceania. Some islands are expected to disappear beneath rising seas and we may never restore the ecological integrity of other islands. For example, all but three of the seventy-nine islands in the Tuamotu Archipelago of French Polynesia will likely be inundated with sea level changes in coming years. Fauna from the Tuamotu islands, and from islands like Guam that are heavily impacted by anthropogenic activities, present tremendous challenges to conservationists. The Tuamotu Kingfisher (<i>Todiramphus gambieri</i>) from the island of Niau in French Polynesia, and the captive population of Micronesian Kingfishers (<i>T. cinnamominus</i>), which previously inhabited Guam, are among the world's most endangered birds. Both are endemic species from islands that are not likely to be restored within the foreseeable future. One approach to conservation includes establishing new communities of threatened species on islands where they did not previously exist. Some view conservation translocation as a necessary rescue tool in a crisis situation, and they advocate for guiding translocations with the theory of island biogeography and sophisticated methodological approaches. Others assert that ?assisted colonization? only exacerbates the invasive species problem. The two Pacific kingfishers have been the focus of ongoing research aimed at determining how to establish rescue populations on islands that did not previously host similar species. Both programs incorporate ecological theory and structured approaches based on a series of field investigations, experiments, and synthetic population modeling. However, the programs have also faced substantial challenges and sometimes troubling ethical considerations associated with introducing species for the sake of conservation.		

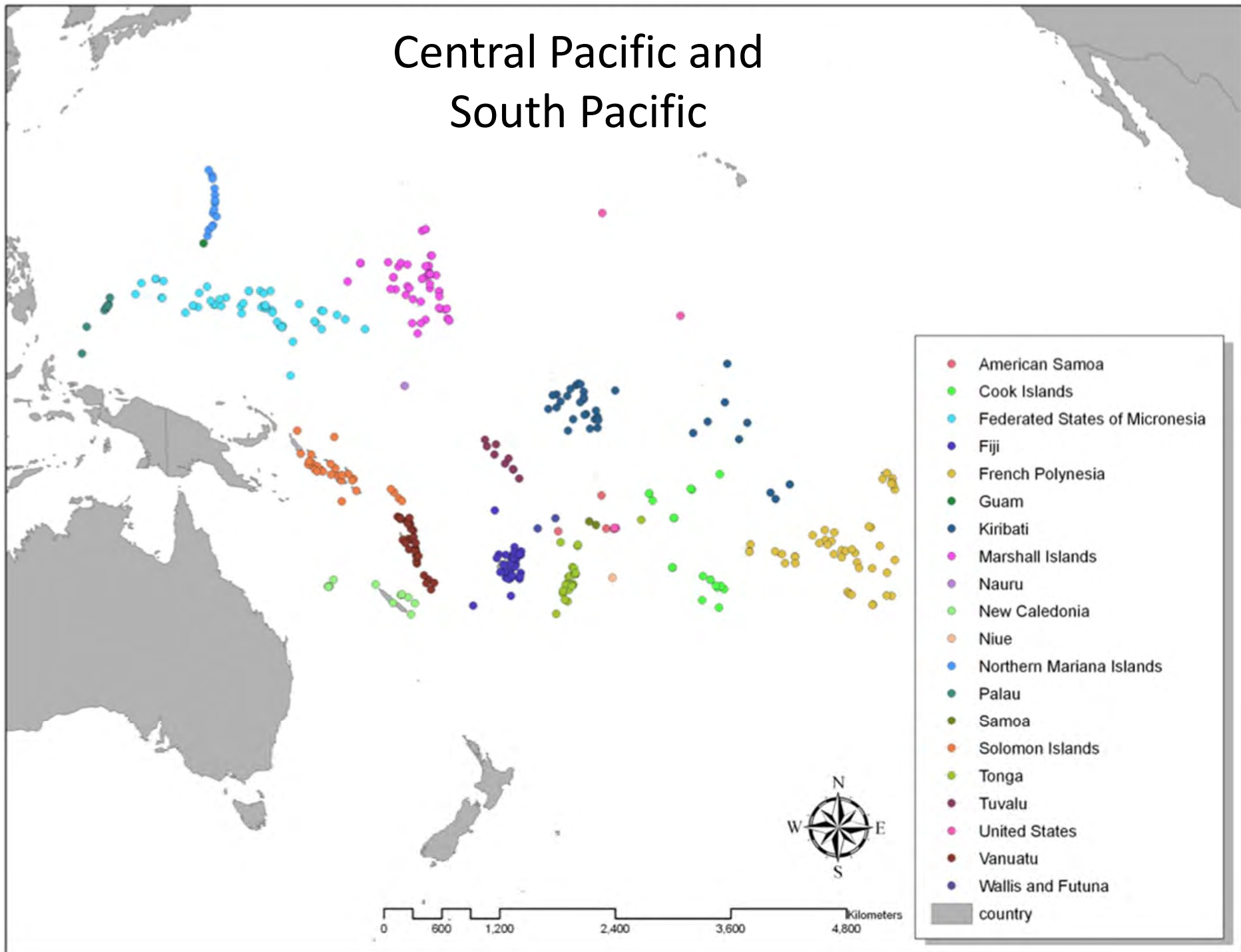
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 42	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

TRANSLOCATION AS A CONSERVATION TOOL FOR INSULAR AVIFAUNA

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Faced with climate change, species invasions and habitat alterations, conservationists are using triage approaches for biodiversity preservation on the islands of Pacific Oceania. Some islands are expected to disappear beneath rising seas and we may never restore the ecological integrity of other islands. For example, all but three of the seventy-nine islands in the Tuamotu Archipelago of French Polynesia will likely be inundated with sea level changes in coming years. Fauna from the Tuamotu islands, and from islands like Guam that are heavily impacted by anthropogenic activities, present tremendous challenges to conservationists. The Tuamotu Kingfisher (*Todiramphus gambieri*) from the island of Niau in French Polynesia, and the captive population of Micronesian Kingfishers (*T. cinnamominus*), which previously inhabited Guam, are among the world's most endangered birds. Both are endemic species from islands that are not likely to be restored within the foreseeable future. One approach to conservation includes establishing new communities of threatened species on islands where they did not previously exist. Some view conservation translocation as a necessary rescue tool in a crisis situation, and they advocate for guiding translocations with the theory of island biogeography and sophisticated methodological approaches. Others assert that "assisted colonization" only exacerbates the invasive species problem. The two Pacific kingfishers have been the focus of ongoing research aimed at determining how to establish rescue populations on islands that did not previously host similar species. Both programs incorporate ecological theory and structured approaches based on a series of field investigations, experiments, and synthetic population modeling. However, the programs have also faced substantial challenges and sometimes troubling ethical considerations associated with introducing species for the sake of conservation.

Central Pacific and South Pacific

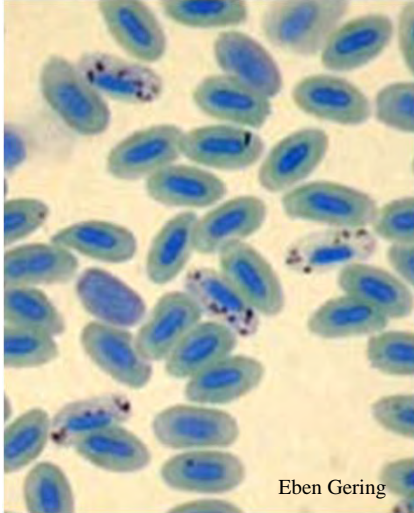


Birds of Pacific Oceania

90% of avian
extinctions from
islands

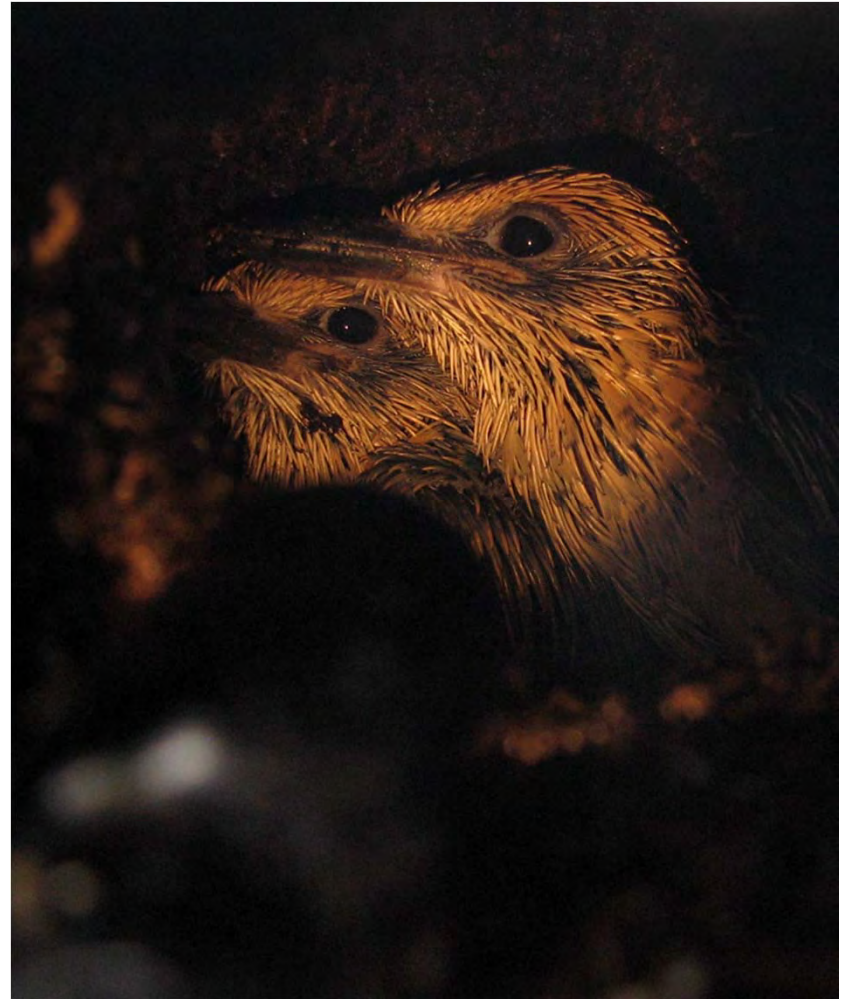


Causes of Avian Decline



Approaches to Island Conservation

- Historically approached using continental techniques.
 - Habitat preservation.
 - In-situ/ex-situ protection.
 - Genetic diversity.
 - Stop invasive species.
- But islands differ from continents!!!



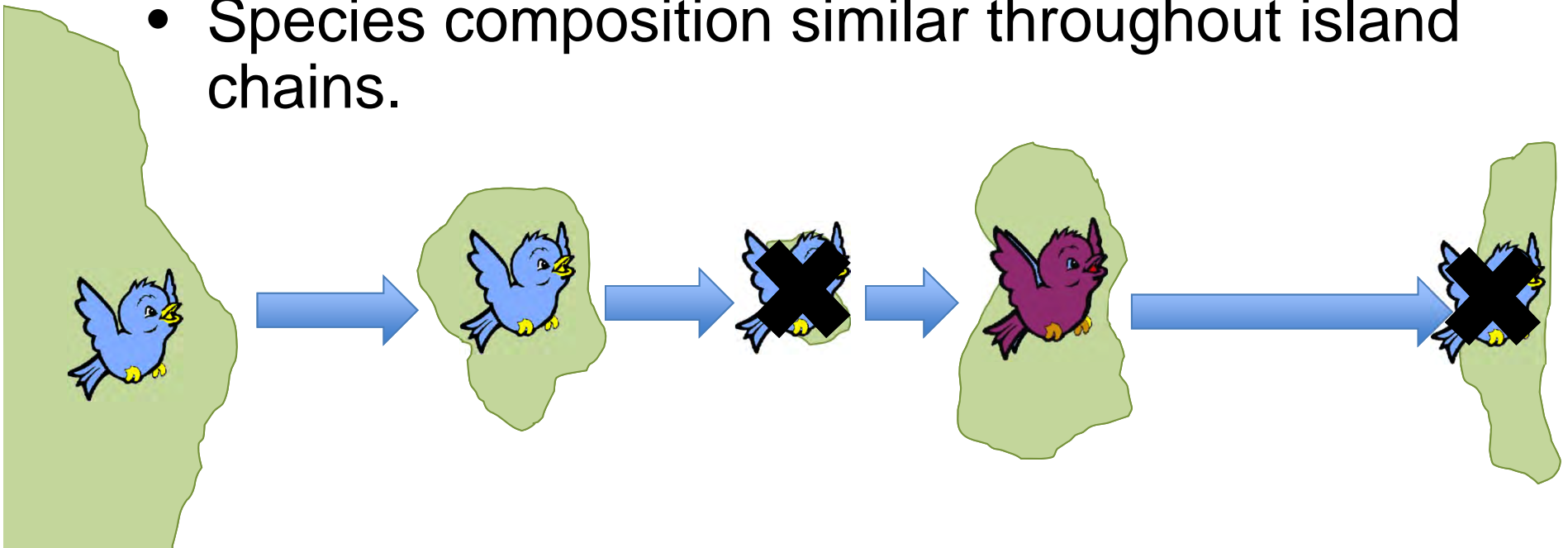
Island Species

- Island bird species are generalists. They are not very good at any one thing.
- BUT! Island species can tolerate a wide range of island conditions.



Island Colonizations

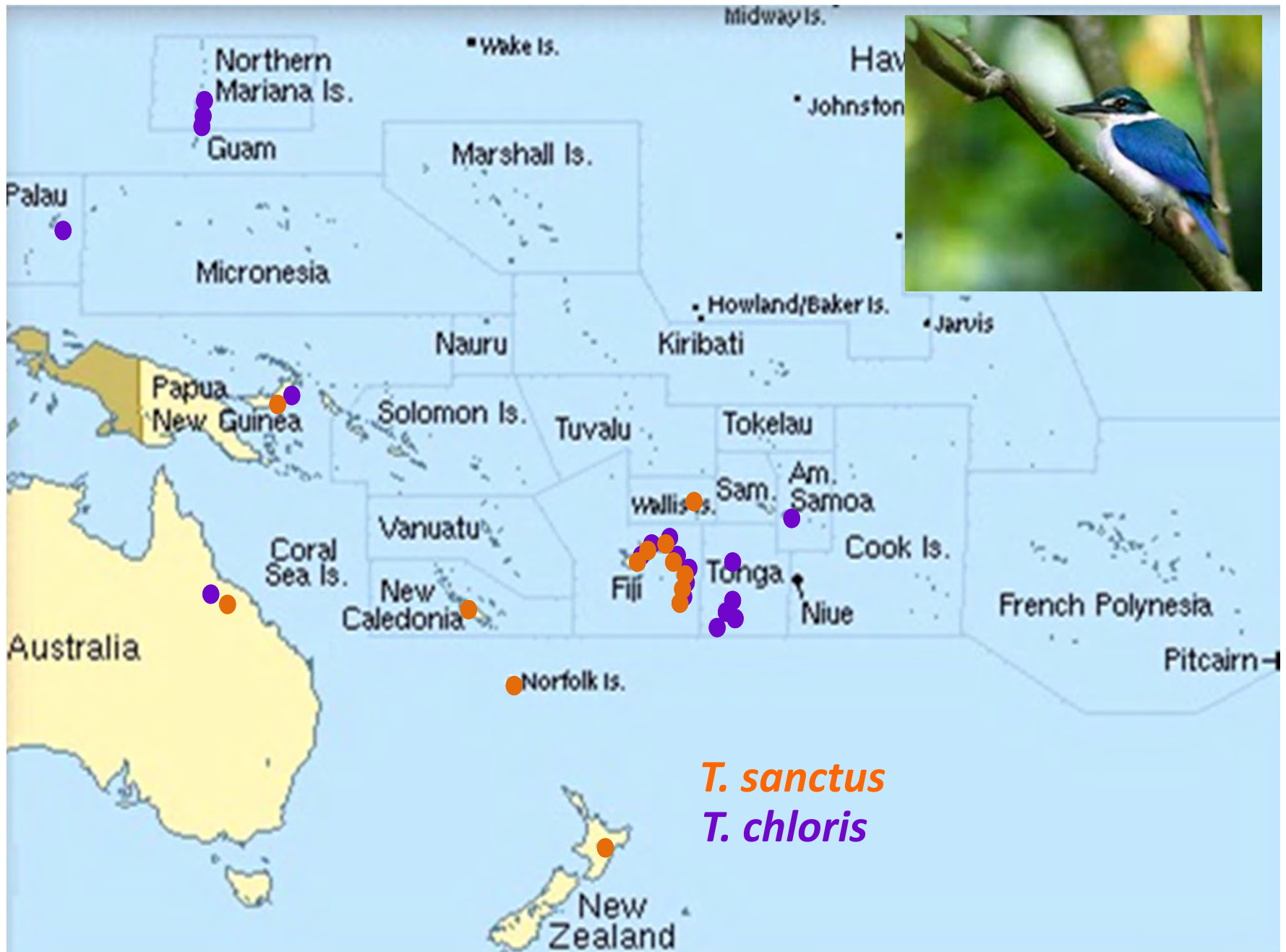
- Island species established through colonization events that originate from continents.
- Island Biogeography Theory tells us how the islands became populated.
- Species composition similar throughout island chains.

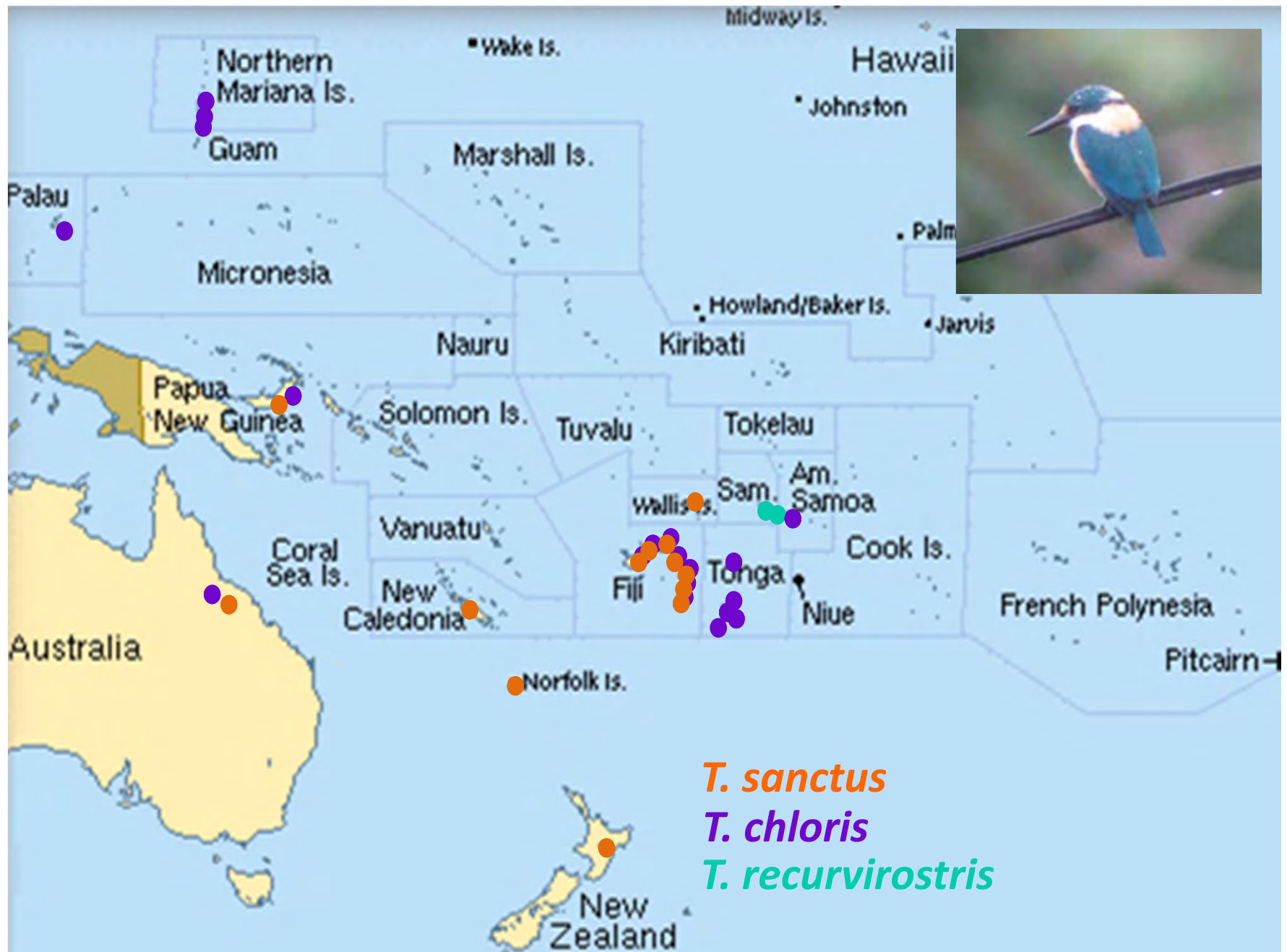


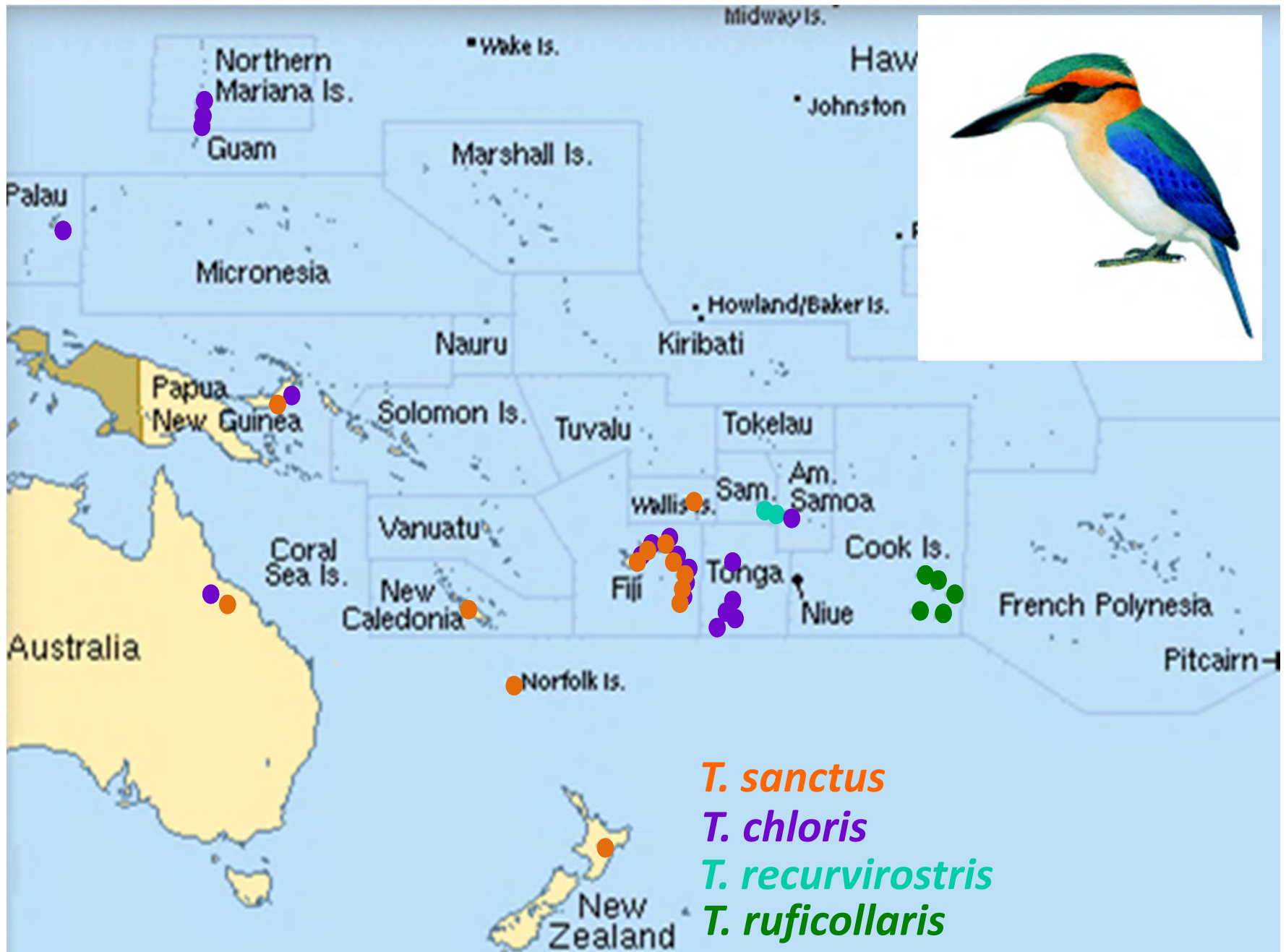


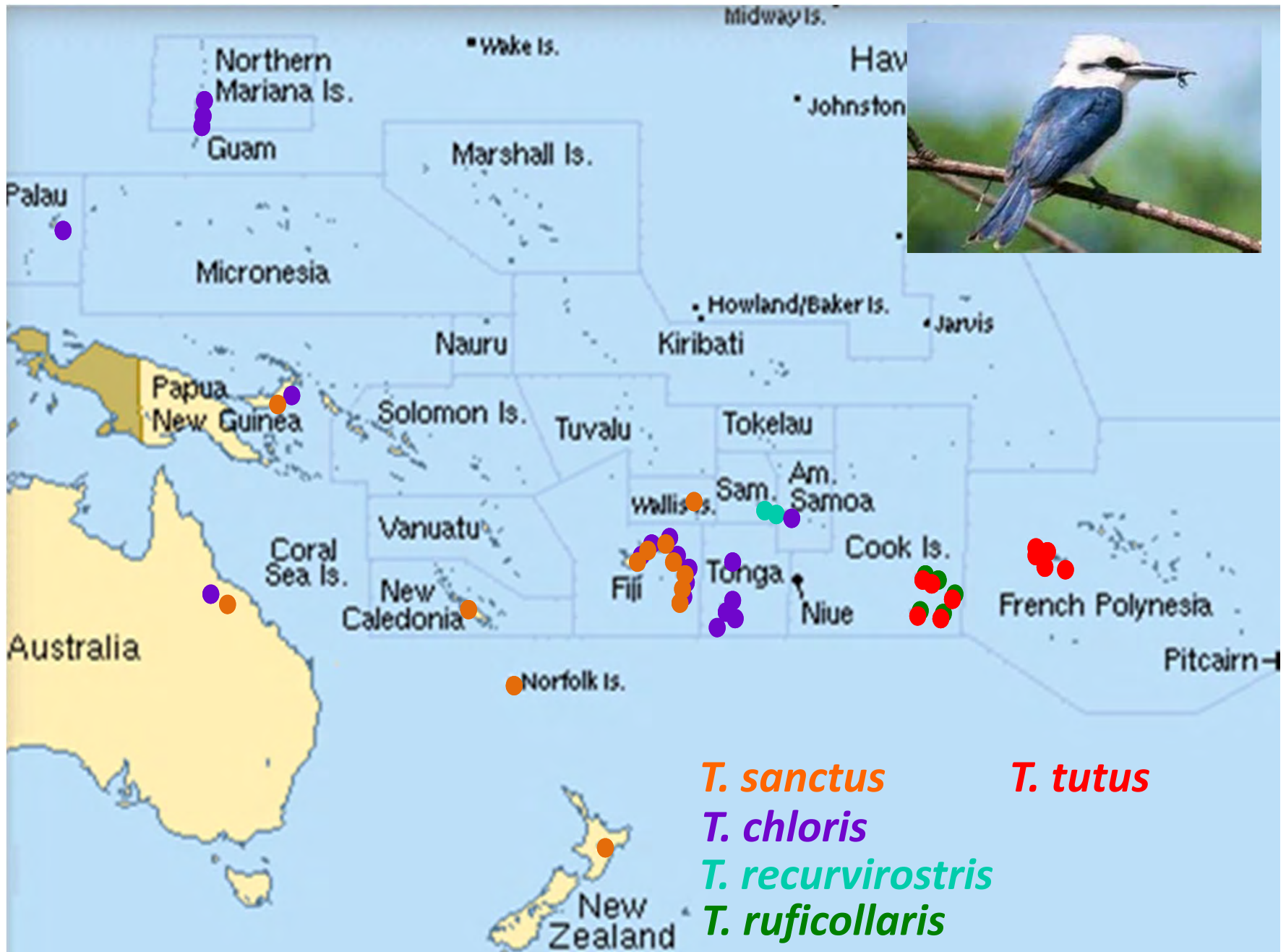


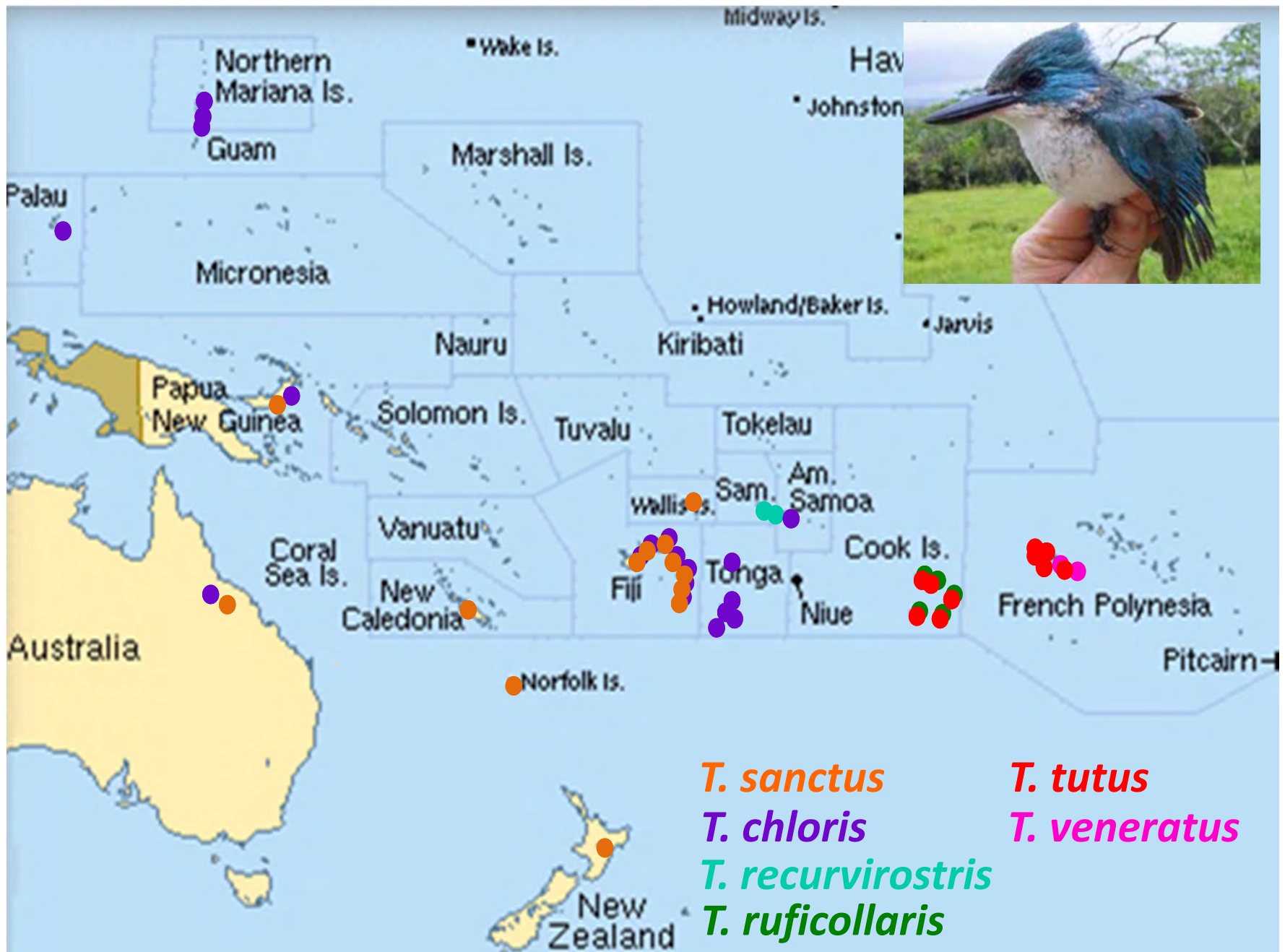


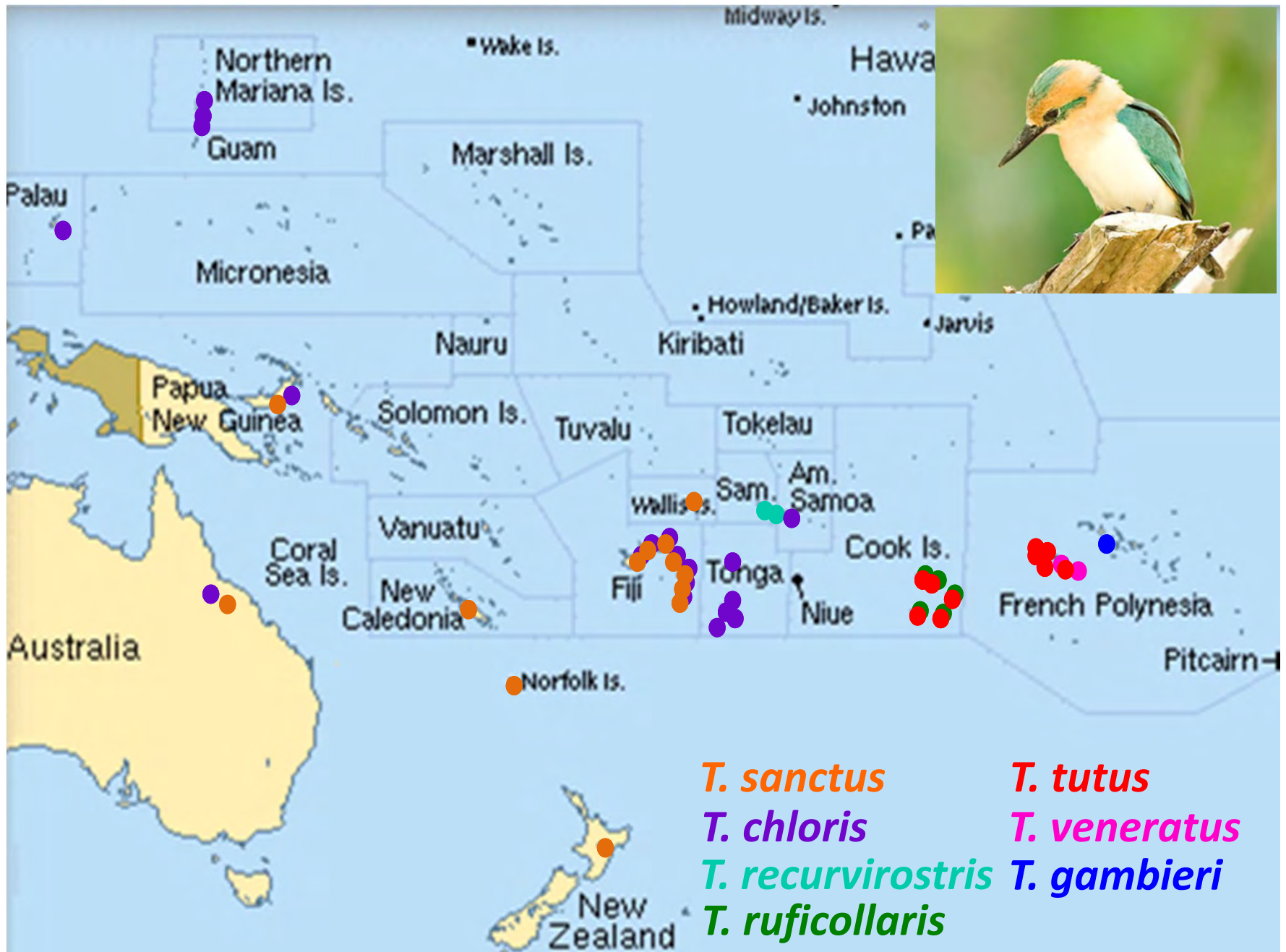


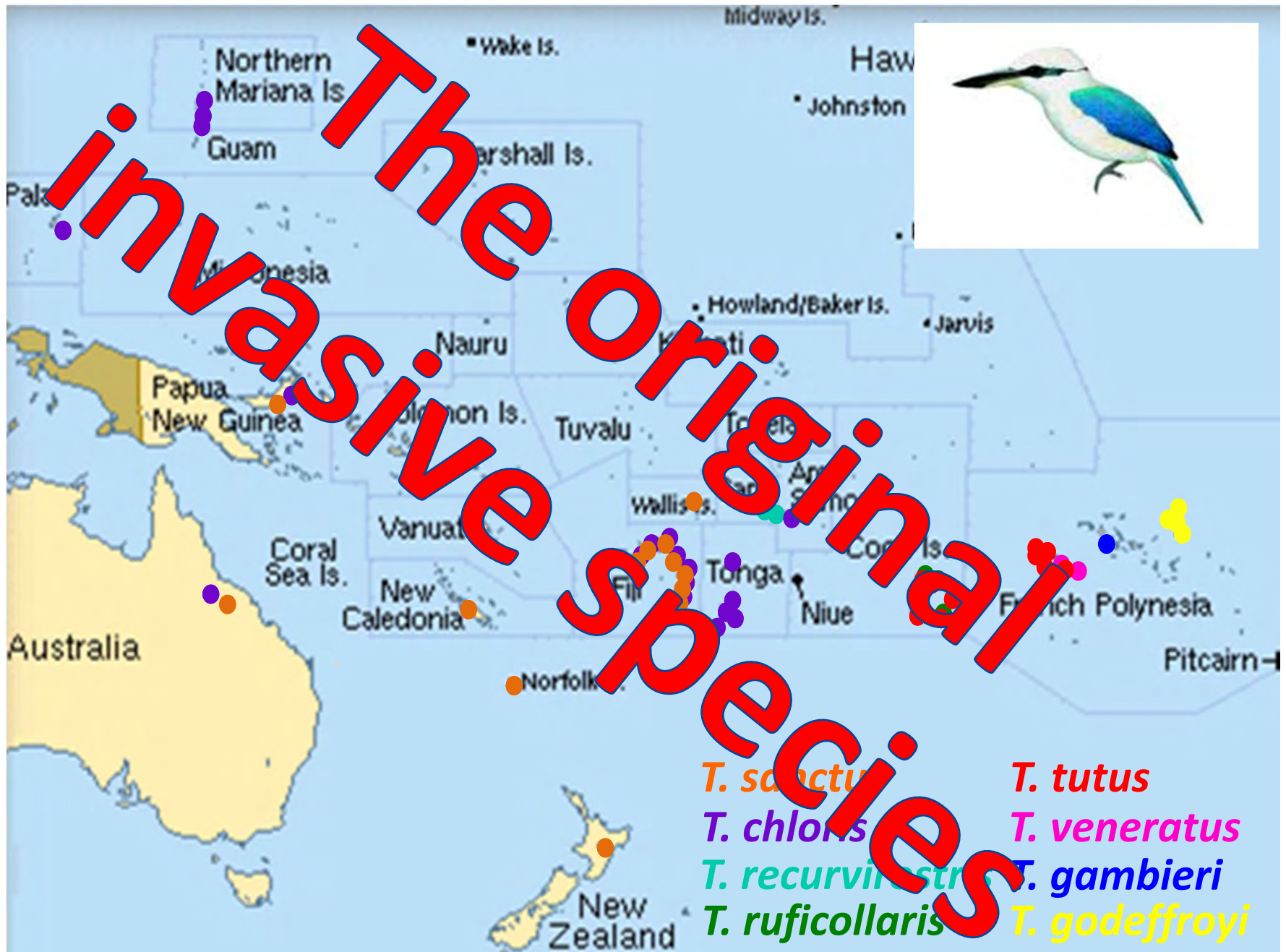












Conservation Management



- Use knowledge of natural history.
- Guide management by ecological theory.

Conservation Management



- Use knowledge of natural history.
- Guide management by ecological theory.
- **Conservation introductions and assisted colonization!**

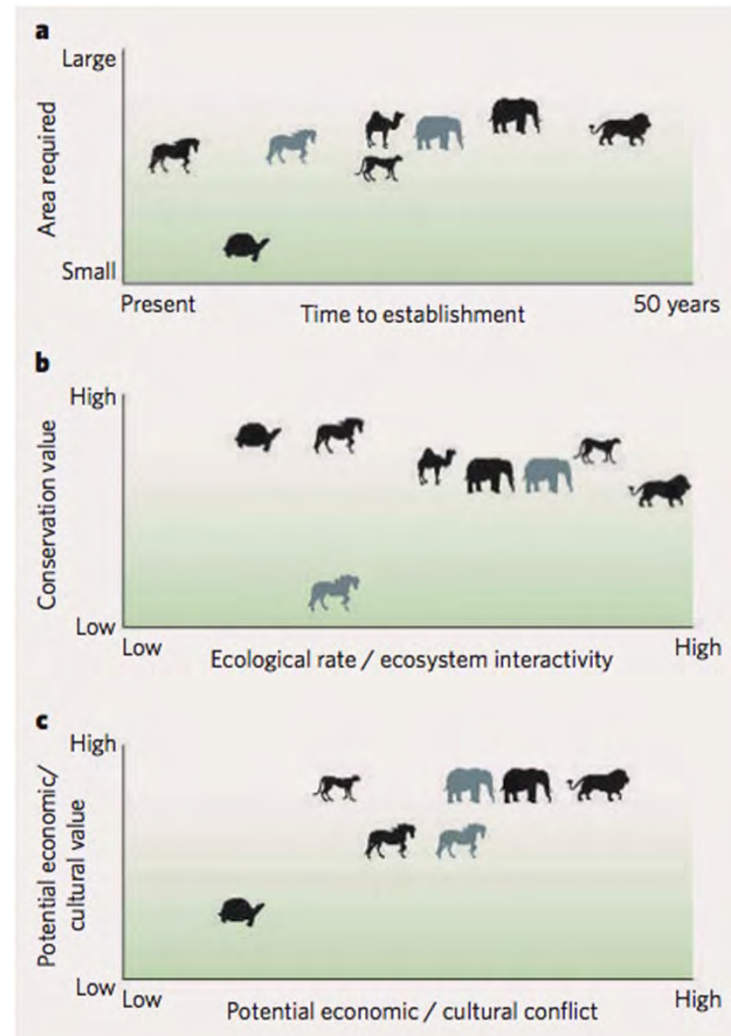
Assisted Colonization



- Translocation – population movement.
- Reintroduction – release within historic range.
- Assisted colonization – release outside range.

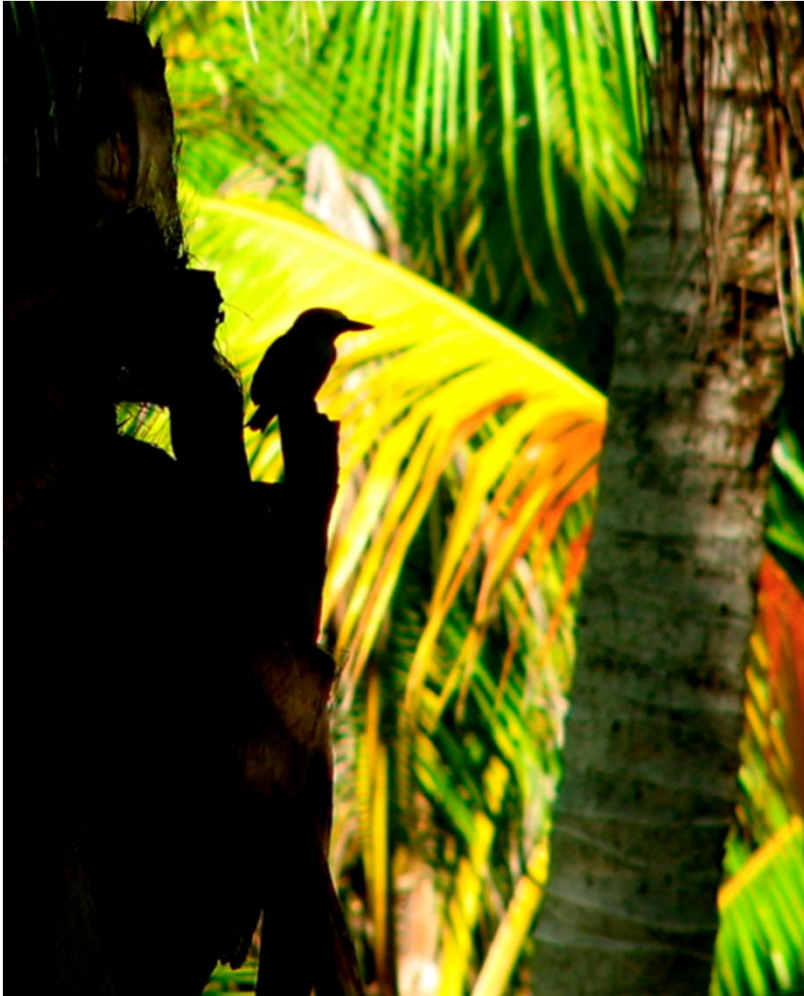
Useful?

- Inspired by “Re-wilding North America” (Green et al. 2005)
- Under climate change scenarios, translocation may be the only rescue option.
- Decisions? (Hoegh-Guldberg et al. 2008)
 - Risk of extinction?
 - Technically possible?
 - Benefits outweigh costs?



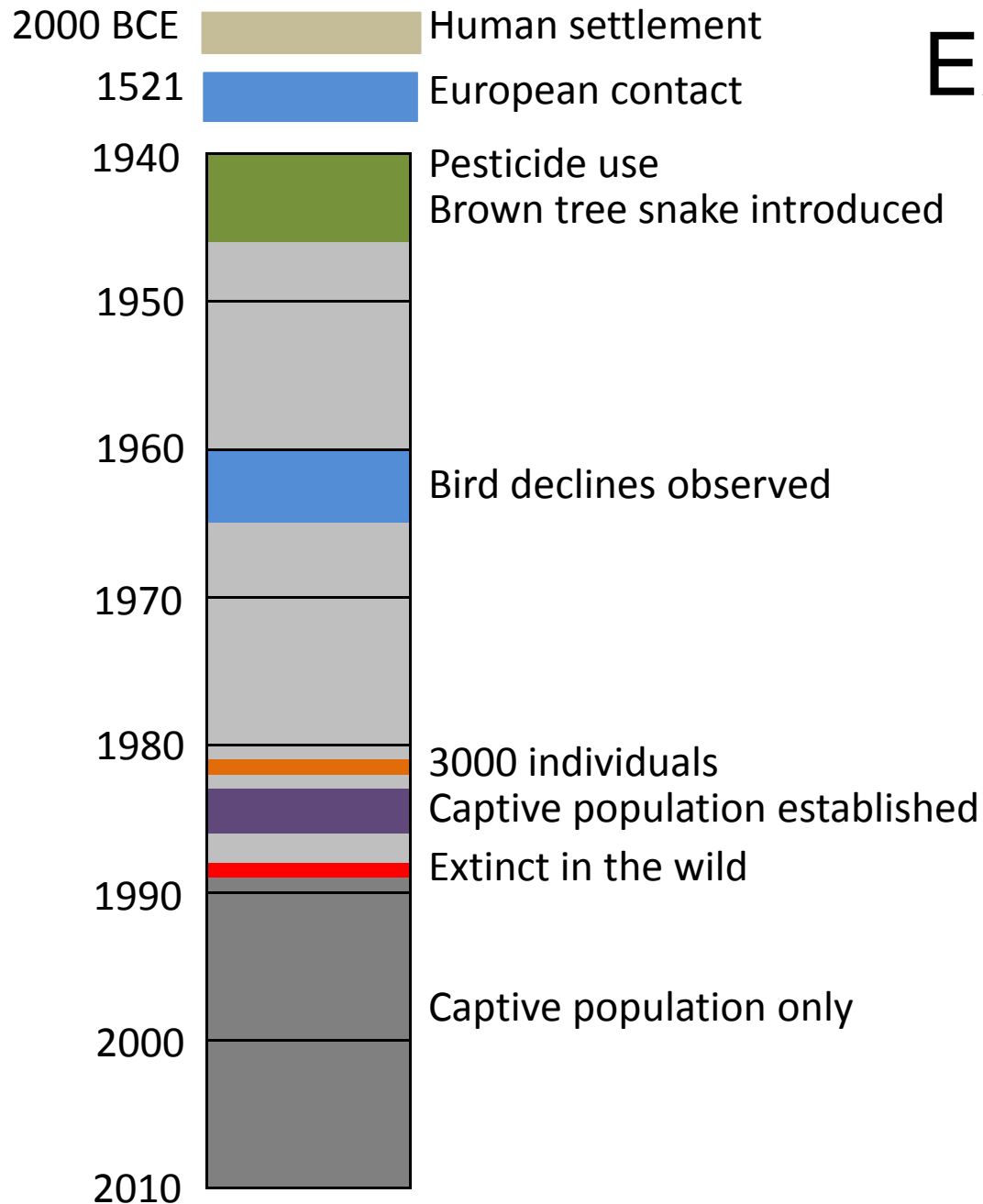
Green HW, Berger J, Bock CE, Bock JH, Burney DA, Estes JA, Foreman D, Martin PS, Roemer GW, Soulé M. 2005. Re-wilding North America. *Nature* 436:913–914.

Criticisms?



- Reasons for caution evidenced by previous introductions.
- “tantamount to ecological roulette.” (Richardson et al. 2009)
- “ecological gambling.” (Ricciardi and Simberloff 2009)
 - Disrupt ecosystems.
 - New pest species.
 - Hybridization.
 - Lag time for impacts.

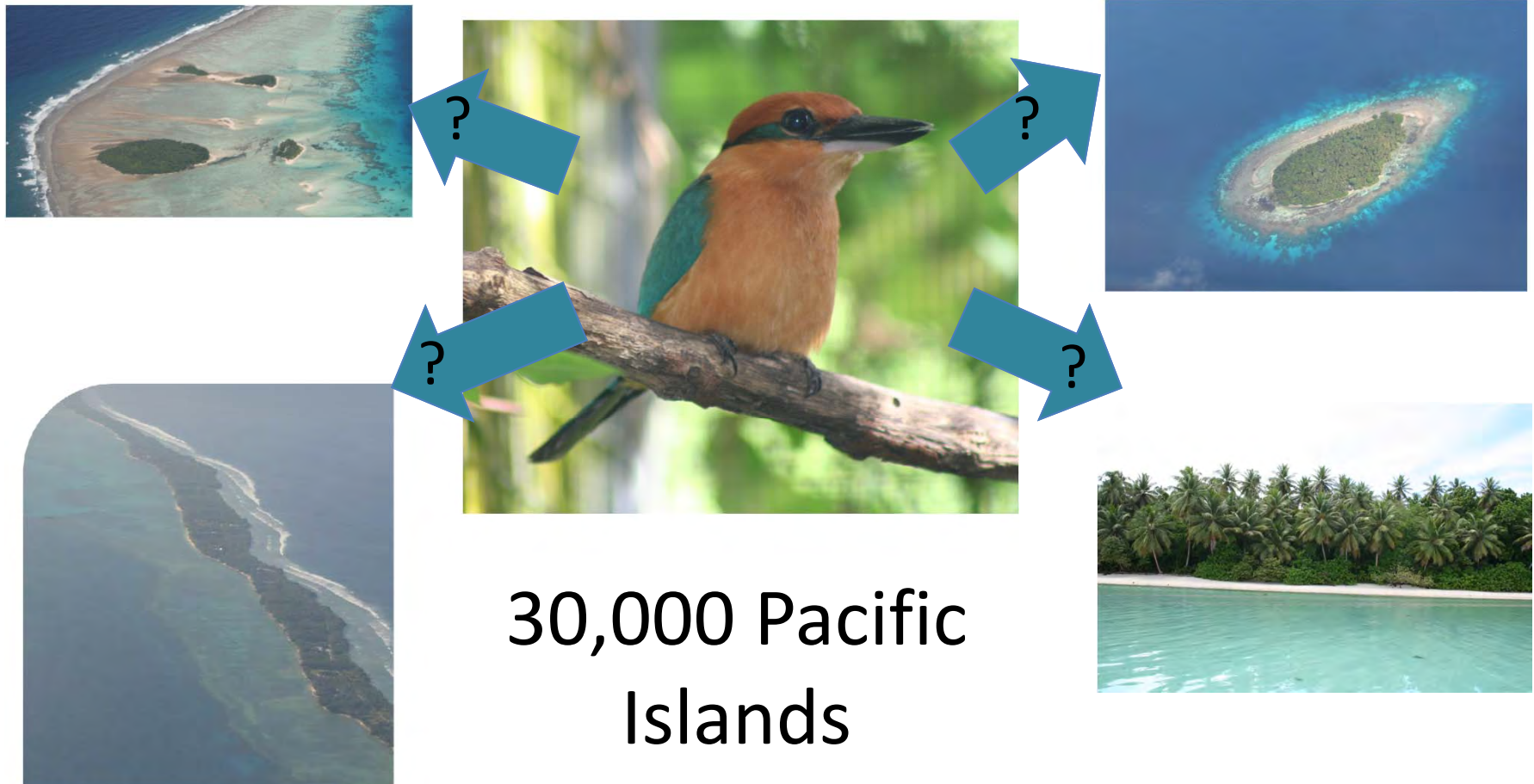




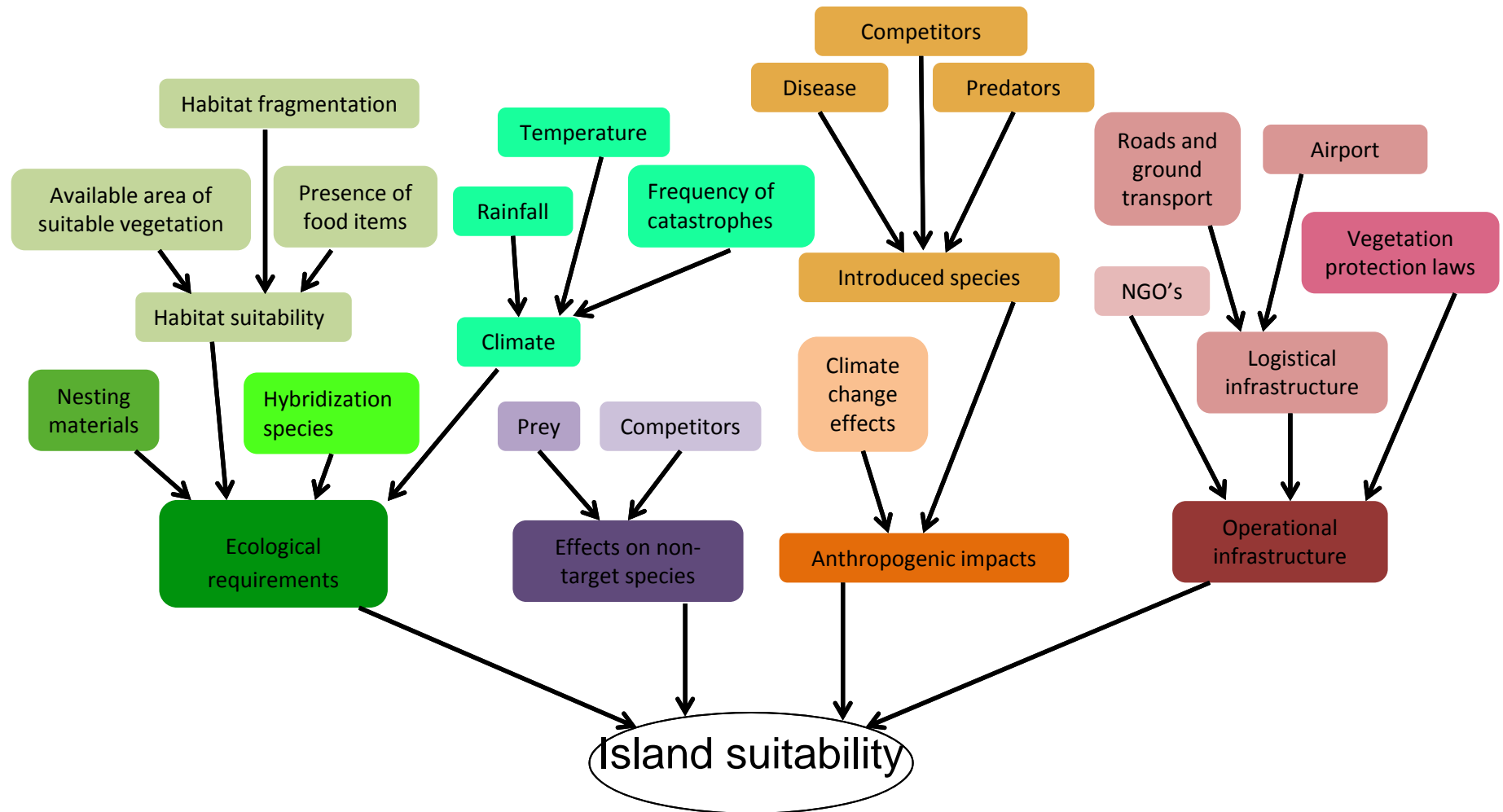
Example 1: Guam Micronesian Kingfisher



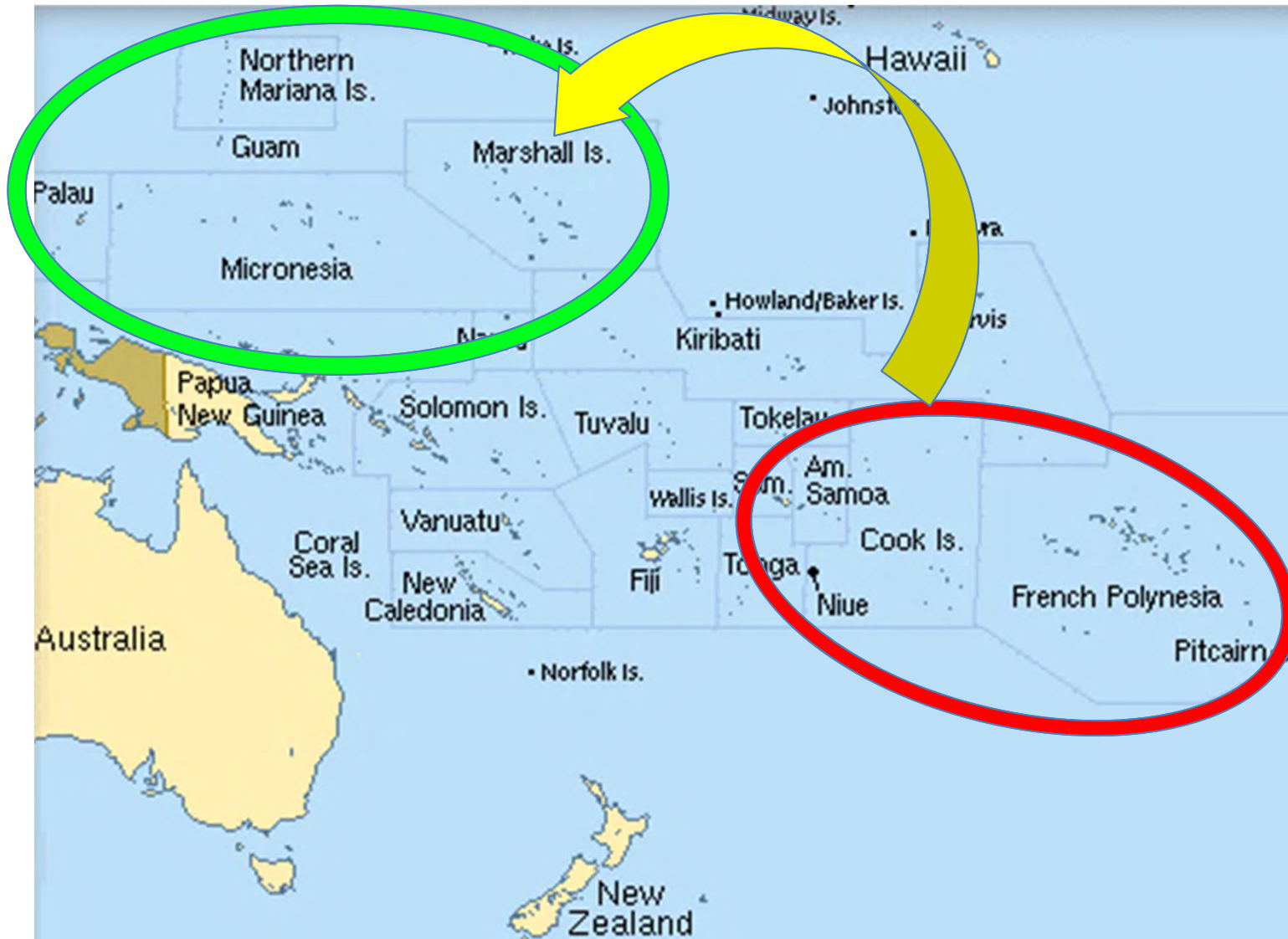
Assisted colonization for the Micronesian Kingfisher

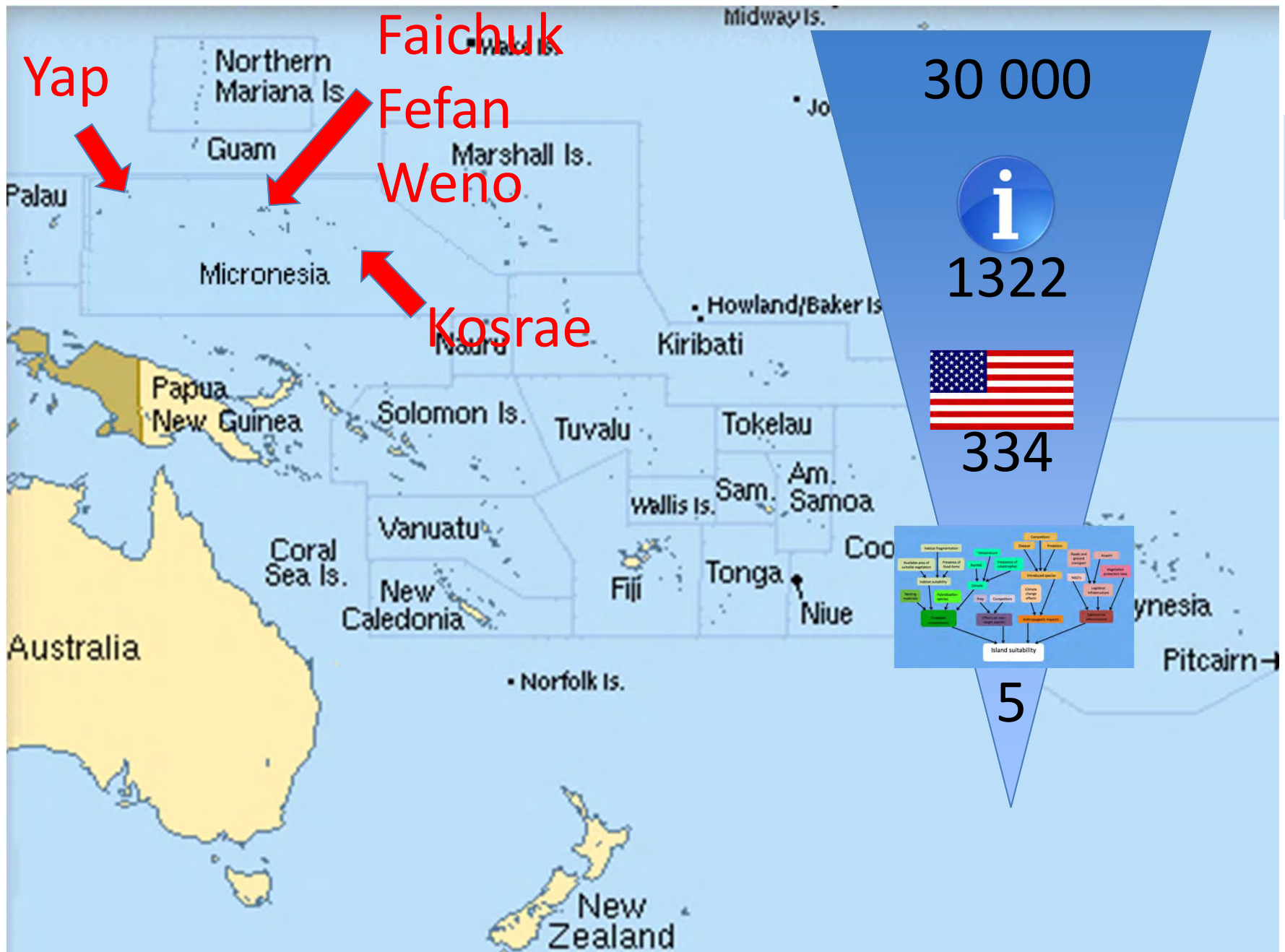


Bayesian Belief Networks

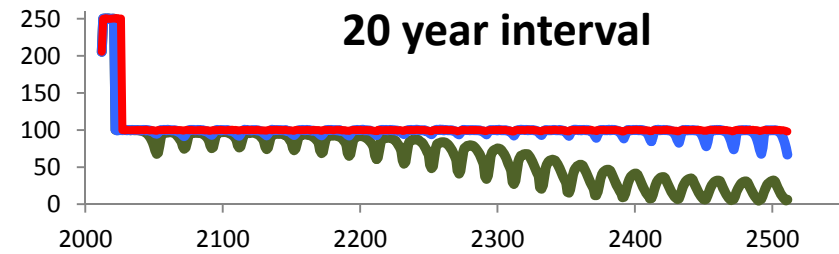
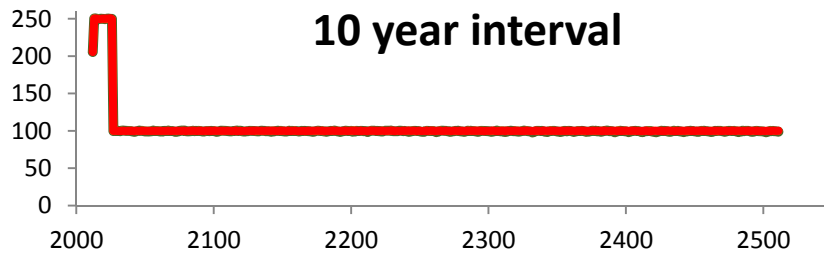


Island selection





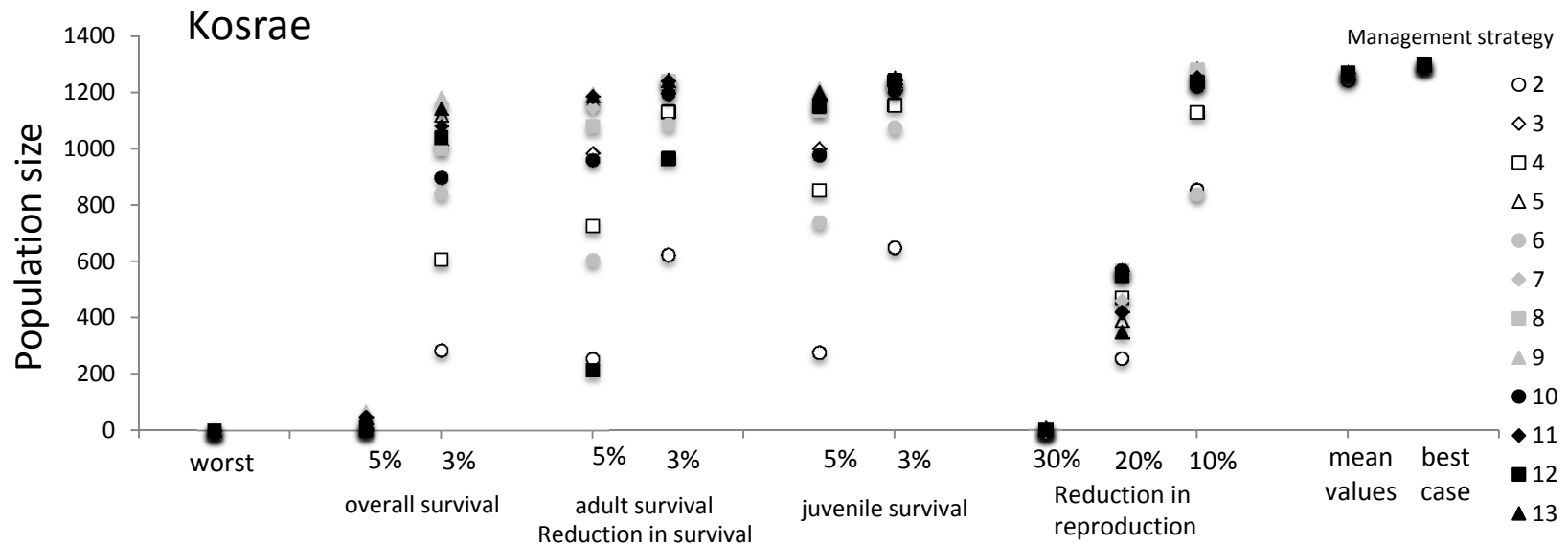
How Should Translocations Occur?



6 individuals

12 individuals

24 individuals



Example 2: Tuamotu Kingfisher (*Todiramphus gambieri*)



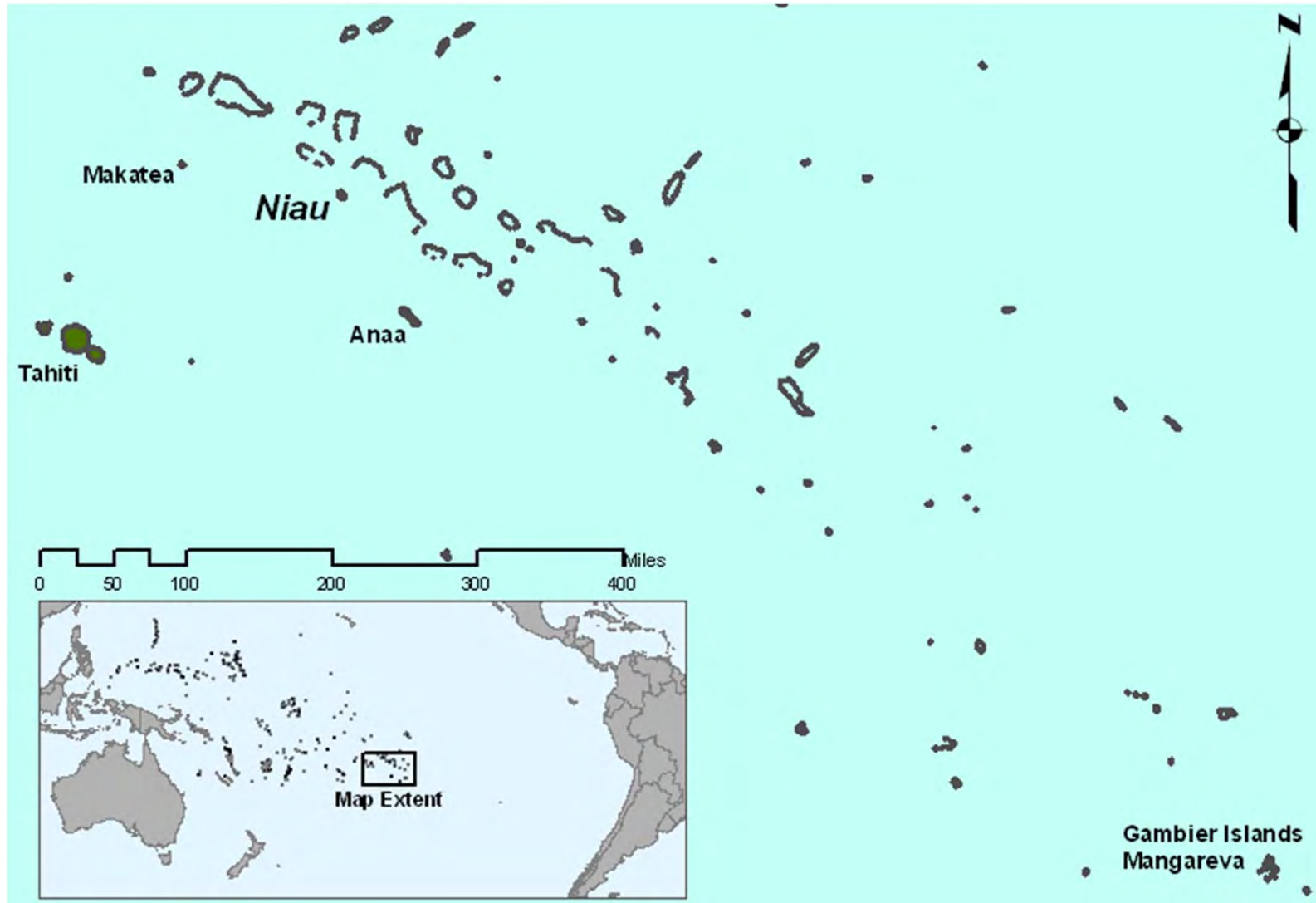
- Critically endangered (IUCN 2008).
- Endemic to Niau (26 km²).
- Almost nothing known about this bird.

Conservation Approach

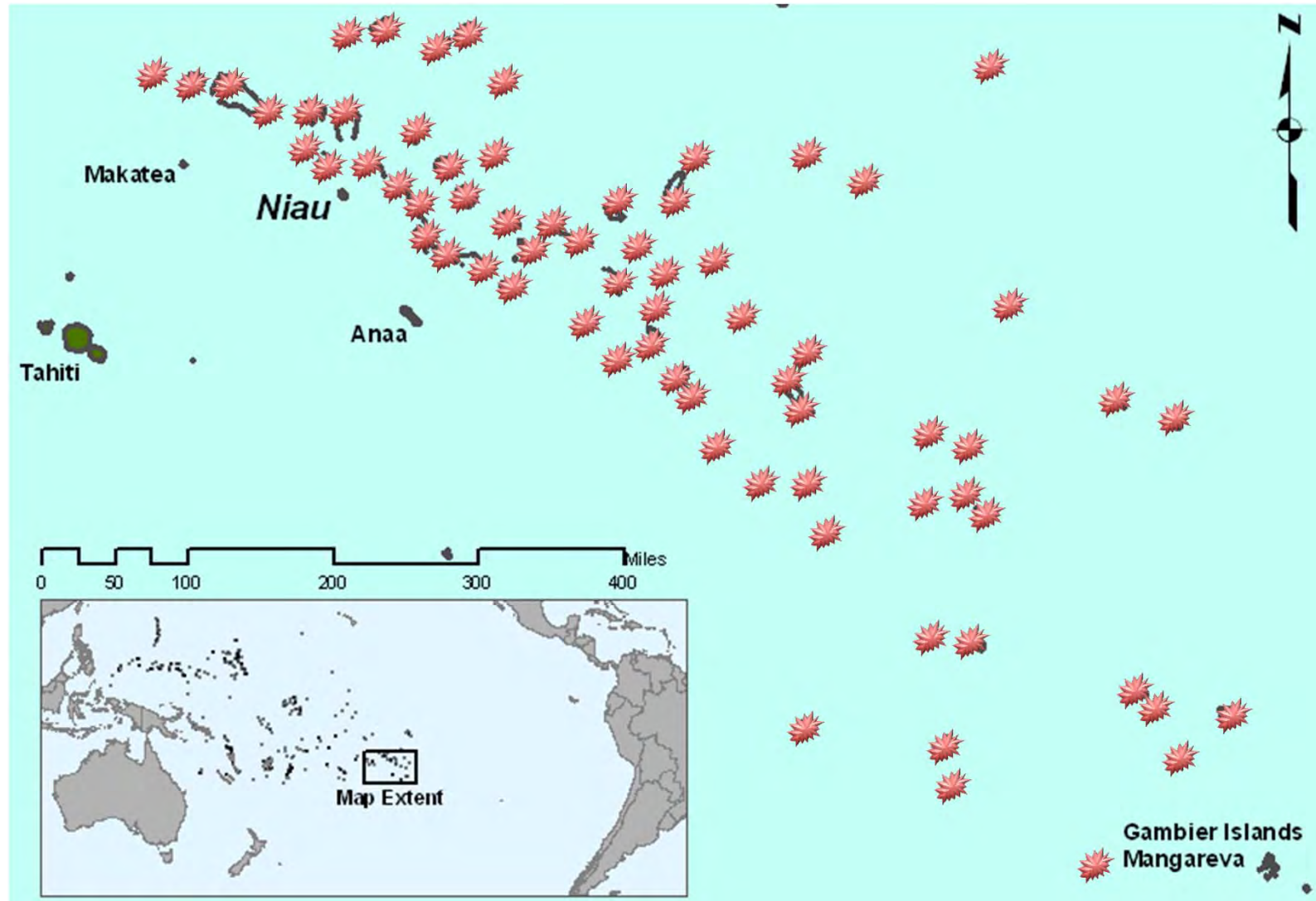
- **Conservation on Niau**
- **Establish rescue population on another island.**
 - Site identification.
 - Translocation design.
 - Translocation.
 - Monitoring.



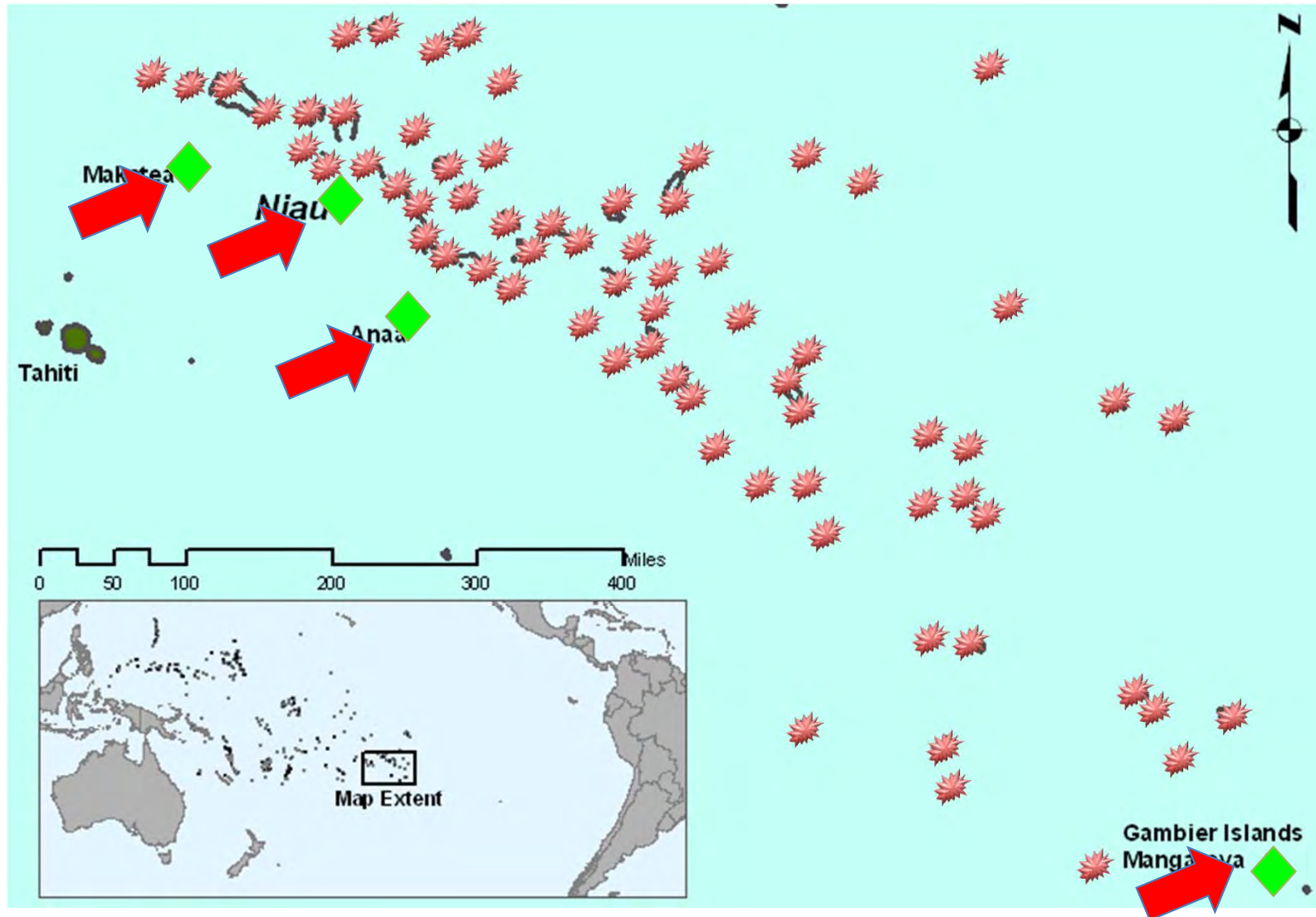
Tuamotu Islands, French Polynesia



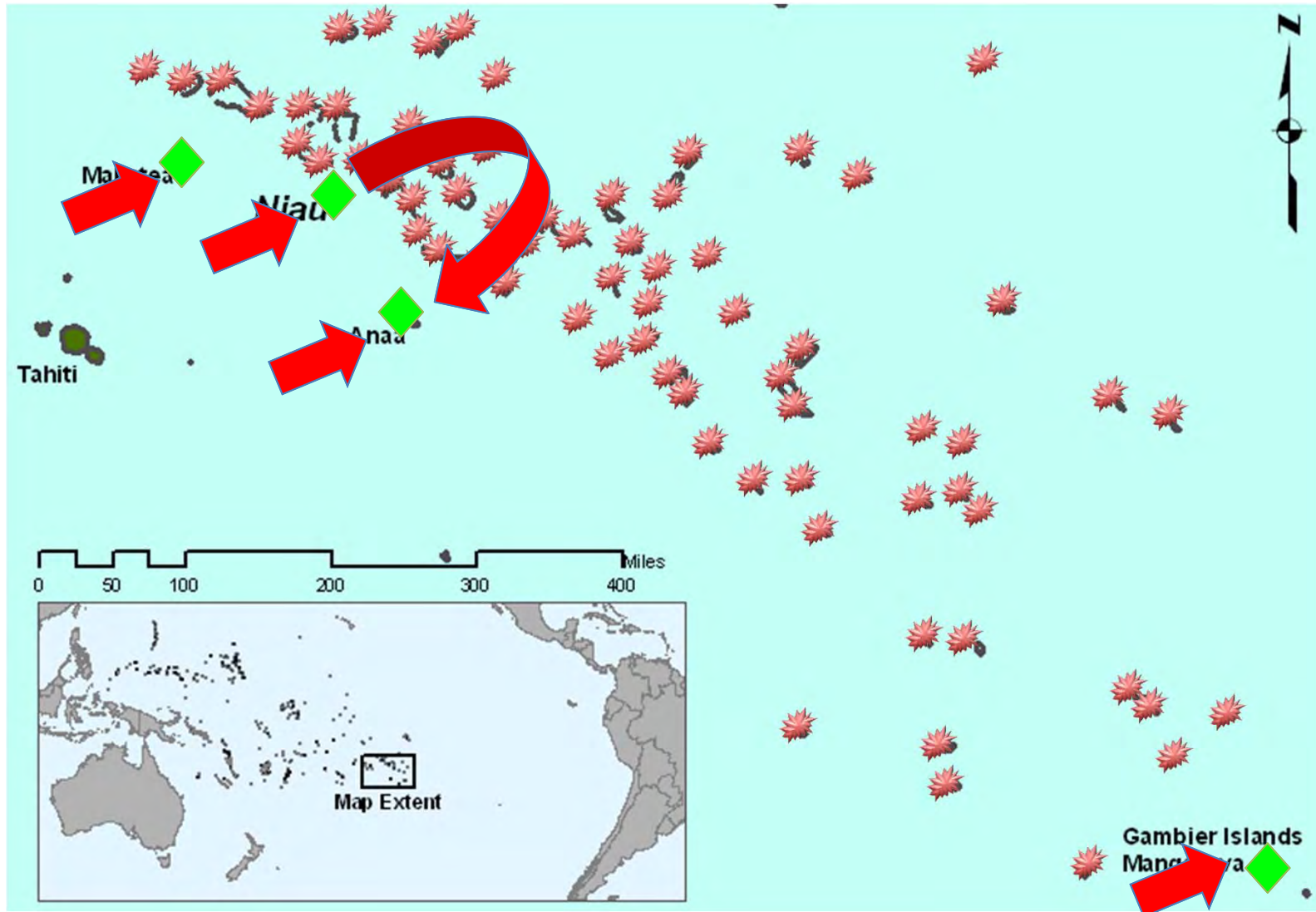
Climate Change – Seal Level Change



High Islands

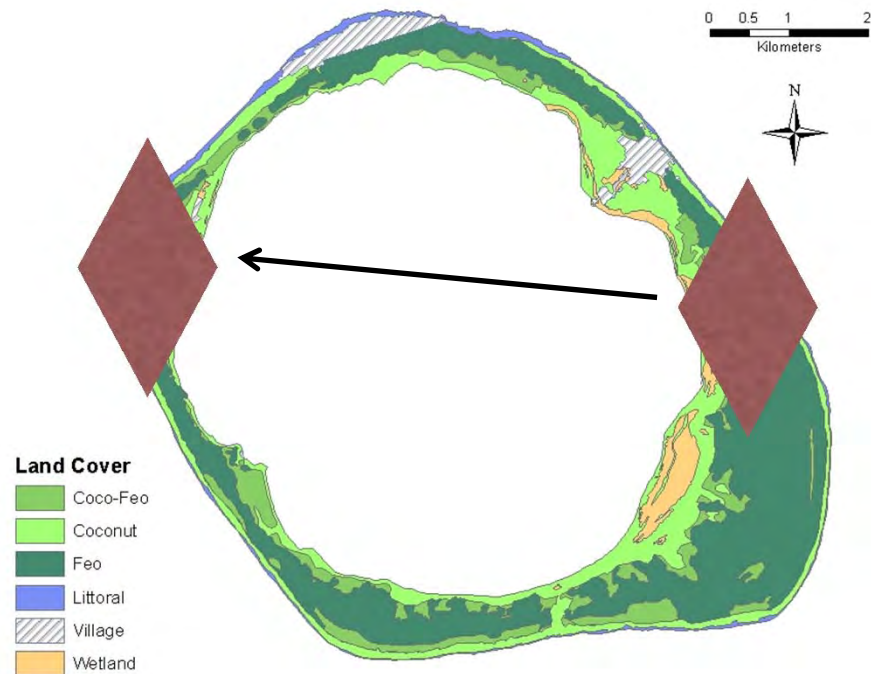


Translocation?

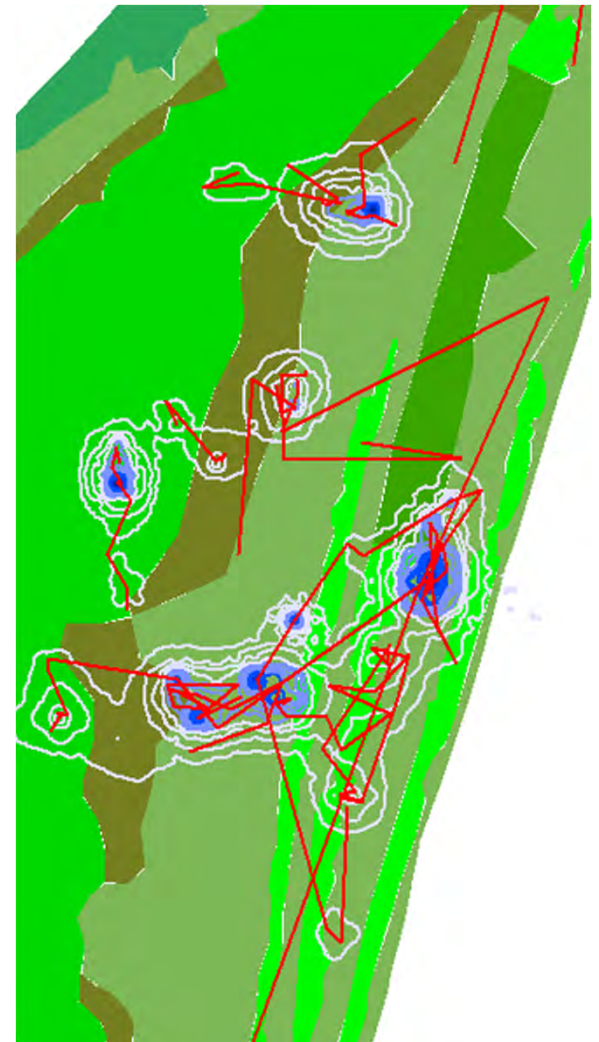
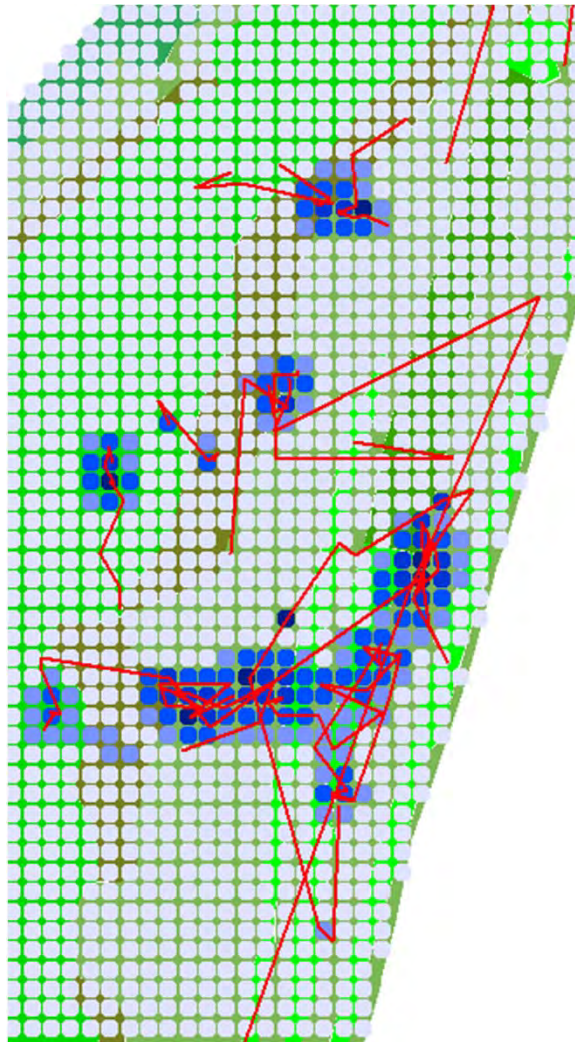


Test Translocation

- Translocation.
- Radio-marked.
 - Donor territories.
 - Translocated adults.
- Guidance for post-release behavior.

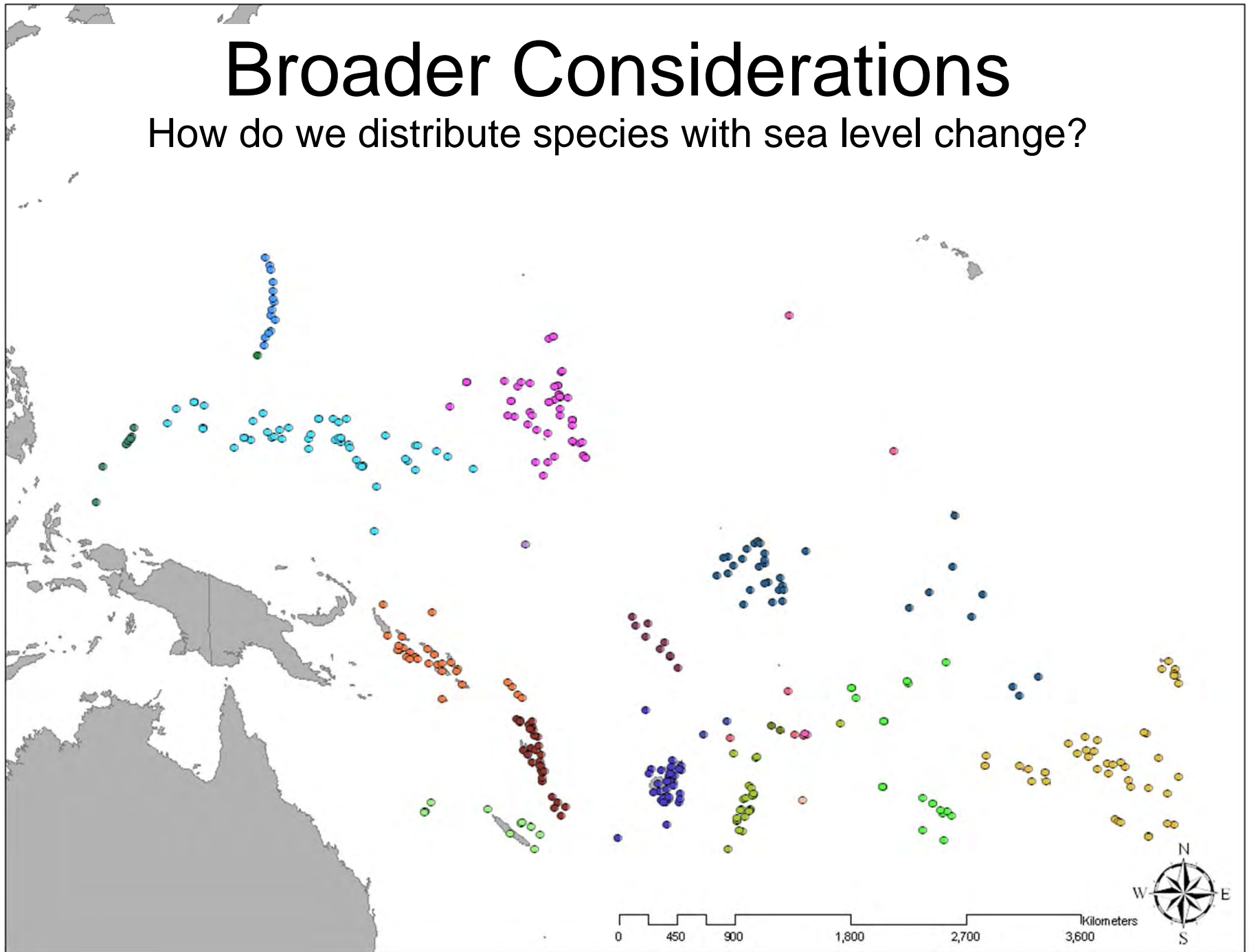


Movement Ecology and Natal Dispersal



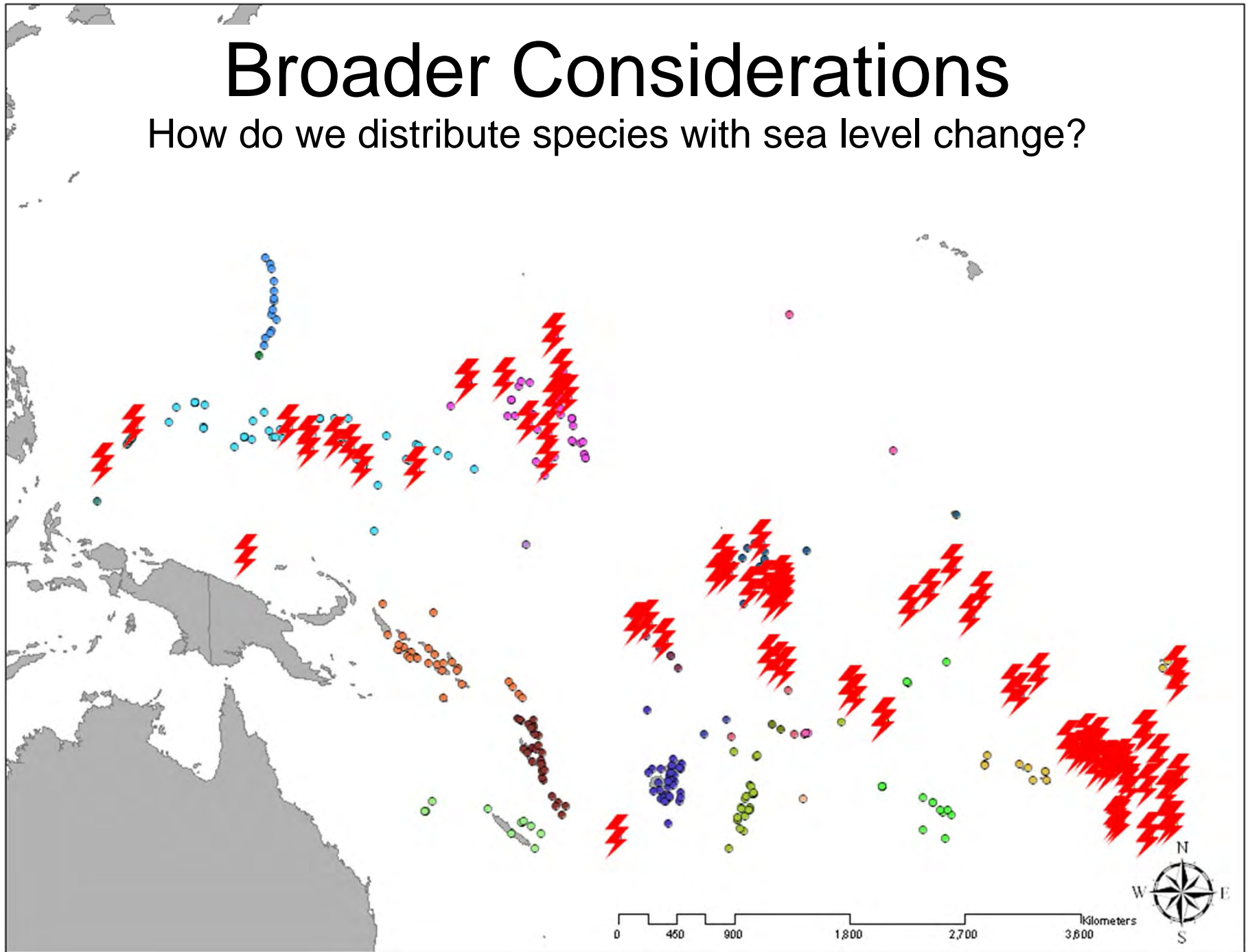
Broader Considerations

How do we distribute species with sea level change?

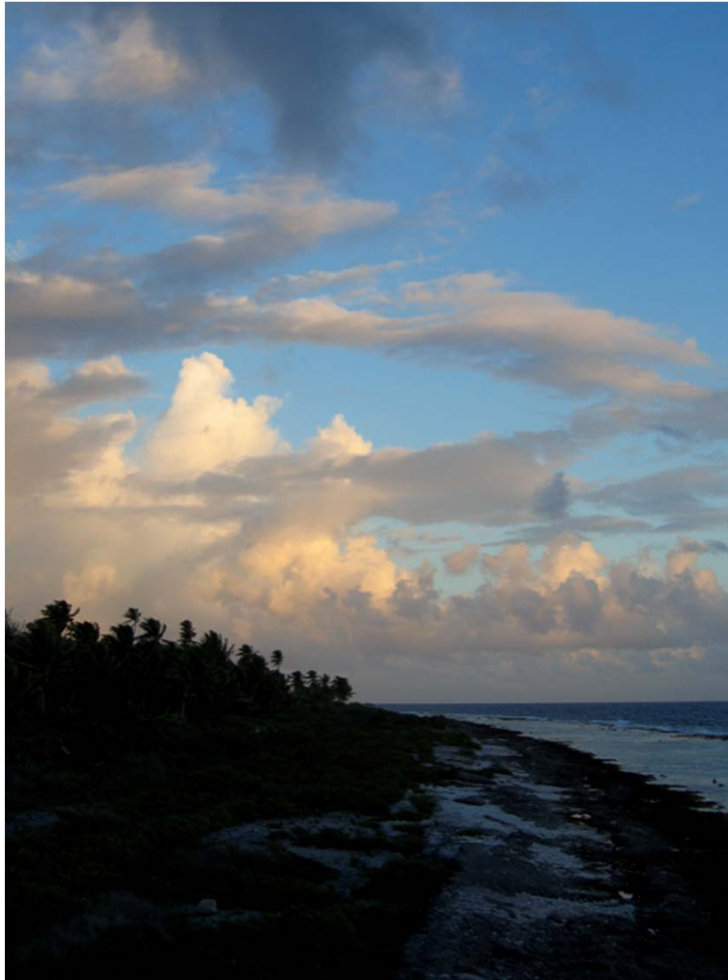


Broader Considerations

How do we distribute species with sea level change?



A Pacific Reorganization



- Use existing decision support tools.
- Embrace ecological knowledge.
- Use theory to guide decisions.
- Move with all due speed.



Financial and Material Support

University of Missouri, Disney
Worldwide Conservation Fund, Société
d'Ornithologie de Polynésie, Birdlife
International, US Fish and Wildlife
Service, Pacific Islands Conservation
Research Association, USGS, Virginia
Tech

Special thanks to citizens of Niau,
Gambier Islands, Makatea, Anaa, and
Tahiti. France and the government of
French Polynesia also supported the
Manu mission and conservation in
French Polynesia.



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